

REMARKS/ARGUMENTS

In response to the Office Action dated March 11, 2005, the outstanding rejections are respectfully traversed as applied to the currently pending claims. Claims 2, 17 and 23-30 have been canceled. New claims 31-35 have been added. Entry of the above amendments and reconsideration of the claims in light of the comments herein is requested.

Rejections under 35 USC 112

The claims are rejected under 35 U.S.C. § 112, second paragraph. The position asserted in the Action is that the wire bonding landings of the substrate panel invention are not exposed and therefore the claims are indefinite. This rejection is respectfully traversed. In general, one aspect of the invention applies to a substrate panel (e.g., Claims 1-14 and others) which can have exposed contacts on its top surface (See, for example, in Fig. 5A). Another aspect of the invention comprises a packaged IC (e.g., claims 15-23 and others) that may or may not have exposed contacts on its top surface depending on the implementation chosen. Accordingly, the basic premise offered in support of this 112 rejection is defective. This is explained in greater detail below.

With respect to claims 1 and 11, the claims relate to "a substrate panel for use in semiconductor packaging." This substrate panel is depicted, for example, in Fig. 5A with a die mounted on top. In any case these substrates are depicted with exposed contacts (e.g., 136, 133, 168 and so on) on the bottom. Also, wire bonding landings 132 are depicted on top (See, Figs. 3C, 4B, 5A, etc.). In the outstanding 112 rejections, the position appears to be that since the substrate panel can be used in a fully encapsulated semiconductor package, that the wire bonding landings would likely not be exposed in the final package. Although, in some implementations, the top surface of the substrate panel can be fully encapsulated (possibly covering the uppermost contacts), this is by no means the only possible use or implementation of the claimed substrate panel. Accordingly, it is respectfully submitted that this fact is not pertinent to the definiteness of the rejected claims. Claims 1 and 11 relate to the substrate panel, and as acknowledged by the Examiner, the wire bonding landings are exposed on the top surface of the substrate panel. There is no requirement that such a structure be encapsulated, such is only one possible implementation. It should be pointed out that just such a structure can be (and is) shipped out as a final product in exactly the format claimed in Claims 1 and 11. Thus, assertions that such product is only an intermediate structure or that the top surfaces are not exposed is just plain false and cannot be used as a basis for rejection. Accordingly, it is respectfully submitted that the 112 rejections of claims 1 and 11 should be withdrawn for at least this reason.

As for the rejection based on the applicant's claims to "wire bonding landings" (e.g., 132) and "lead segments" 134 (See, for example, claim 11). This is an entirely accurate, the claimed

structure can include “wire bonding landings” (e.g., 132) that are electrically connected with “lead segments” 134. These conductive portions are described to more clearly illustrate the relationship between the narrow lead segments which can connect with the wider landings and lead contacts. As is well depicted in the drawings, the landings 132 are wider enabling wirebonding. Such wire bonding would prove to be very difficult if attempted on the narrower lead segments 134. Also, lead segments are important in (in some cases) creating conductive paths to lead contacts 130 that are not mounted at or near the periphery of the substrate. These thin lead segments 134 enable much higher electrical interconnection densities. Also, in some implementations it is the lead segments 134 that create a conductive path from the edge or peripherally mounted landings 132 to the more centrally situated lead contacts 130 which are located at some distance from the edges of the resulting substrate. This point is made especially clear in claims like Claim 23. Accordingly, the applicants discern no indefiniteness in these claims.

As to Claim 15, this claim is directed to a package. Although, the applicants see no inconsistency or indefiniteness in the asserted claim the applicants have amended Claim 15 as follows. Claim 15 now reads “a plurality of wire bonding landings at exposed on a top surface of the substrate”. Such language should address the Examiners concerns and also cover embodiments where the wire bonding landings are exposed or covered on a top surface of the substrate. Accordingly, it is respectfully submitted that the 112 rejection of claim 15 should be withdrawn for at least this reason.

As to Claims 9 and 22, these claims have been clarified to specify that “wire bonding landings is directly electrically coupled to the die attach pad by a single only an additional lead segment”. This should be clearer and therefore no longer indefinite.

As to Claim 10, this claim has been clarified to specify that “wherein [[the]] said associated contacts are located closer to the die attach pad than said selected their associated wire bonding landings”. This amendment should correct any perceived ambiguity in the associated claim.

The remaining claims rejected under 35 U.S.C. § 112 are all based on the claims discussed above. Accordingly, for at least the reasons advanced above, all of the dependent claims should also be allowable. Therefore, the applicants respectfully submit that based on the foregoing amendments and explanatory remarks, all pending §112 rejections have been overcome. Accordingly, for at least the reasons expressed above, the applicants request that the pending rejections be withdrawn.

Rejections under 35 USC 102

Claims 1, 2, 4, 5, 7, 9, 11, 12, 14, 15, 17, 19 and 22 were all rejected as being anticipated by Huang. These rejections are respectfully traversed both with respect to the claim language as originally filed and the claims as amended herein.

As originally filed, independent claims 1, 11 and 15 each required that the lead frame include: (a) a plurality of contacts; (b) a plurality of wire bonding landings; and lead segments that electrically couple selected wire bonding landings to associated contacts. Additionally, in Claims 1, 11, & 15, the “top surface of the dielectric material is substantially coplanar with the top surface of the substrate panel and the wire bonding landings”. In the Huang reference this is clearly not the case with the second dielectric layer including some very substantial walls 124 that extend upward from the lead frame panel. Many things can be said about the top surface of the substrate, but it cannot be said that the massive protrusions of 124 are a “top surface of the dielectric material is substantially coplanar with the top surface of the substrate panel”. Accordingly, Huang cannot be said to teach this limitation.

Additionally, Huang is deficient for a number of other reasons. For example, the outstanding rejection identifies Huang component 104 (i.e., the leads 104) as corresponding to the lead segments. However, the rejection appears to rely on those same leads as constituting the contacts. It is respectfully submitted that since the bottom surfaces of the cited leads 104 act as the contacts, the Examiner has not identified (and Huang does not disclose) the use of lead segments that electrically couple wire-bonding landings to associated contacts. In view of these points, it is respectfully submitted that a prima facie case of anticipation has not been made in this case and that the outstanding rejections of all of the pending claims should be withdrawn for at least this reason.

It is fairly clear that Huang is deficient as to a number of the dependent limitations as well. For example, Claims 3 & 18 claim that “the wire bonding landings are thinner than the substrate panel, such that the wire bonding landings are not exposed on the bottom surface of the substrate panel”. An example of this concept is illustrated in Fig. 5A of the present application. The bonding wire 140 is adhered to the thin (half etched) portion defined by wire bonding landing 132. Whereas in the cited art, the wire is attached to the thick (i.e., passes all the way through the substrate) portion 104 which is directly connected to the bottom of the substrate. Thus, the two structures are dissimilar.

In an additional example Claims 4 & 19 teach a substrate panel with “portions of the lead segments [that] are thinner than the substrate panel such that the selected portions of the lead segments are not exposed on the bottom surface of the substrate panel”. There is no indication of any such lead segments in the Huang reference. In fact the only such electrical connections taught by Huang are the wire bonds 140. In another way of looking at claim 4, it is pointed out that claim 4 requires that the lead segments (the portions contacted by the wire bond connection) NOT be exposed on the bottom surface of than the substrate panel. The outstanding rejection identified leads 104 of Huang as corresponding to the recited lead segments. Although that position is respectfully traversed, as described above, it is noted that leads 104 are almost completely exposed on the bottom surface of the substrate and thus would not meet the language

of claim 4 for at least this reason as well. Accordingly, the Huang reference again fails to teach all of the claim limitations under 35 U.S.C. § 102.

Also, Claims 3-10, 12-14, 16 18-23 and 31-35 (also it should be pointed out that no ground of rejection is offered with respect to Claim, 23) each depend either directly or indirectly from one of the independent claims 1, 11 or 15 and are therefore respectfully submitted to be patentable over the art of record for at least the same reasons as set forth above with respect to the independent claims. Additionally, these dependent claims require additional elements that when considered in the context of the claimed invention, further patentably distinguish the art of record. For example, claim 4 requires that the lead segments NOT be exposed on the bottom surface of than the substrate panel. The outstanding rejection identified leads 104 of Huang as corresponding to the recited lead segments. Although that position is respectfully traversed, as described above, it is noted that leads 104 are exposed on the bottom surface of the substrate and thus would not meet the language of claim 4 for at least this reason as well. Accordingly, it is respectfully submitted that the outstanding rejection of claim 4 should be withdrawn for at least this reason as well.

Claims 34 and 35 are directed to microarray. The outstanding rejection asserts that Fig. 10 of Huang meet this claim feature. This assertion is respectfully traversed. Fig. 10 of Huang shows a standard lead frame package type structure. One can see by reference to, for example, Fig. 4A of the present invention, that the contact 136 density of the present invention microarray is far higher than that of the standard edge mounted contacts of the Huang invention. The claimed structure has a density much more akin to a BGA package than the Huang leadframe package. Accordingly, it is respectfully submitted that the outstanding rejection of claims 34 and 35 should be withdrawn for this reason as well.

In general, the applicants believe that Huang is a deficient reference falling short of teaching or suggesting the present invention on many levels. Some of these shortcomings have been pointed out in the discussions hereinabove. For at least the reasons above it is respectfully requested that the rejections of Claims 1, 2, 4, 5, 7, 9, 11, 12, 14, 15, 17, 19 and 22 be withdrawn.

Rejections under 35 USC 103

A few of the claims were rejected under section 103 based upon combinations of the Huang references and either Lee or Chein-Hung. These rejections are respectfully traversed for at least the reasons set forth above with respect to claim 1. Additionally, these dependent claims require additional elements that when considered in the context of the claimed invention further patentably distinguish the art.

In one example, claim 16 requires that the first and second dielectric layers are formed from substantially the same materials but are not integrally formed. The Examiner points to first layer 124 and second layer 126 in Huang Fig. 5. This interpretation of Huang is at odds with the

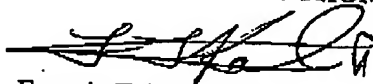
Huang Specification which states that 126 is not a layer at all but merely a "chip containing space (See, Huang e.g., 4:6). Additionally, Lee does not disclose first and second layers (especially at the specified fig. 10) only a single layer 26. Accordingly the combination of Huang and Lee does not comprehend the separately formed base substrate containing and supporting the lead frame and the subsequent formation of the second layer that seals the chip in the device package. This ideas are completely different from anything taught or suggested by the cited references either together or separately. Accordingly, it is respectfully submitted that nothing in the Lee reference would motivate one to alter the device disclosed by Huang in a manner that would read on claim 16. Accordingly, the rejection of claim 16 should be withdrawn for this additional reason as well.

Conclusions

In view of the foregoing, it is respectfully submitted that all pending claims are patentable over the art of record and that this case is now in condition for allowance. Should the Examiner have any remaining concerns regarding the present application, he is encouraged to contact the undersigned at the telephone number set out below.

Respectfully submitted,

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